For the higher-temperature repository operating mode, this EIS assumes closure would begin 100 years after the start of emplacement (76 years after the completion of emplacement). In contrast, repository closure for the lower-temperature repository operating mode could begin 125 to 300 years after the completion of emplacement. Closure would take 10 years for the higher-temperature mode (DIRS 150941-CRWMS M&O 2000, p. 6-22) and between 11 and 17 years for the lower-temperature mode, depending on the waste package spacing.

Closure of the subsurface repository facilities would include the emplacement of the drip shields; removal and salvage of equipment and materials; filling of the main drifts, access ramps, and ventilation shafts; and sealing of openings, including ventilation shafts, access ramps, and boreholes. Filling would require surface operations to obtain fill material from the excavated rock storage area or another source, and processing (screening, crushing, and possibly washing) the material to obtain the required characteristics. Fill material would be transported on the surface in trucks and underground in open gondola railcars. A fill placement system would place the material in the underground main drifts and ramps. DOE would place the seals for shafts, ramps, and boreholes strategically to reduce *radionuclide* migration over extended periods, so these openings could not become pathways that could compromise the repository's postclosure performance (DIRS 153849-DOE 2001, Section 2.3.4.8).

Decommissioning surface facilities would include decontamination activities, if required, and facility dismantling and removal. Equipment and materials would be salvaged, recycled, or reused, if possible. Site reclamation would include restoring the site to as near its preconstruction condition as practicable, including the recontouring of disturbed surface areas, surface *backfill*, soil buildup and reconditioning, site revegetation, site water course configuration, and erosion control, as appropriate.

2.1.3 TRANSPORTATION ACTIVITIES

Under the Proposed Action, DOE would transport spent nuclear fuel and high-level radioactive waste from commercial and DOE sites to the repository. The Naval Nuclear Propulsion Program would transport *naval spent nuclear fuel* from the Idaho National Engineering and Environmental Laboratory to the repository. Naval spent nuclear fuel is one of the DOE fuels considered in this EIS. Transportation activities would include the loading of these materials for shipment at generator sites (Section 2.1.3.1), transportation of the materials to the Yucca Mountain site using truck, rail, heavy-haul truck, or barge [see Sections 2.1.3.2 (National) and 2.1.3.3 (Nevada)], and *shipping cask* manufacturing, maintenance, and disposal (Section 2.1.3.4). Chapter 6 and Appendix J provide further discussion of transportation processes considered.

2.1.3.1 Loading Activities at Commercial and DOE Sites

This EIS evaluates the loading of spent nuclear fuel and high-level radioactive waste at commercial and DOE sites for transportation to the proposed repository at Yucca Mountain. Activities would include preparing the spent nuclear fuel or high-level radioactive waste for delivery, loading it in a shipping cask, and placing the cask on a vehicle (see Figures 2-20 and 2-21) for shipment to the repository. This EIS assumes that at the time of shipment the spent nuclear fuel and high-level radioactive waste would be in a form that met approved acceptance and disposal criteria for the repository.

2.1.3.2 National Transportation

National transportation includes the transport of spent nuclear fuel and high-level radioactive waste from the commercial and DOE sites to the Yucca Mountain site using existing highways (see Figure 2-22a) and railroads (see Figure 2-23a). Figures 2-22b and 23b show the representation highway and rail routes, respectively, used in the EIS analysis to estimate transportation-related impacts (see Section 6.2 for further discussion). Heavy-haul trucks could be used to transport spent nuclear fuel from commercial

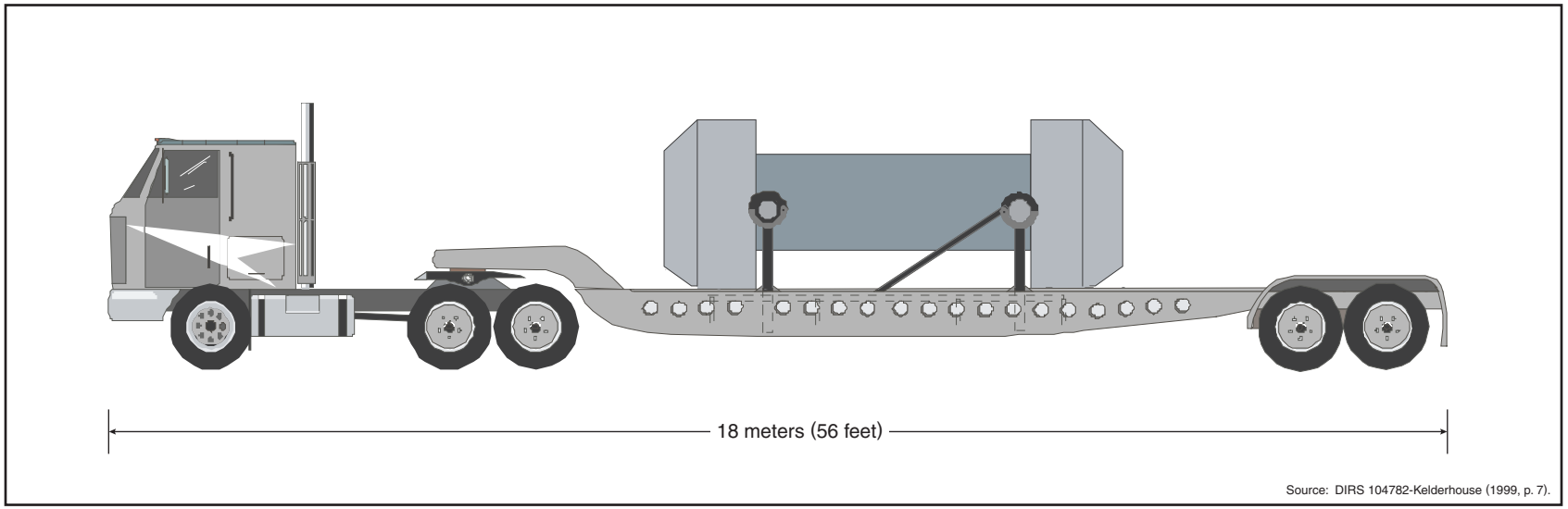

Figure 2-20. Artist's conception of a truck cask on a legal-weight tractor-trailer truck.

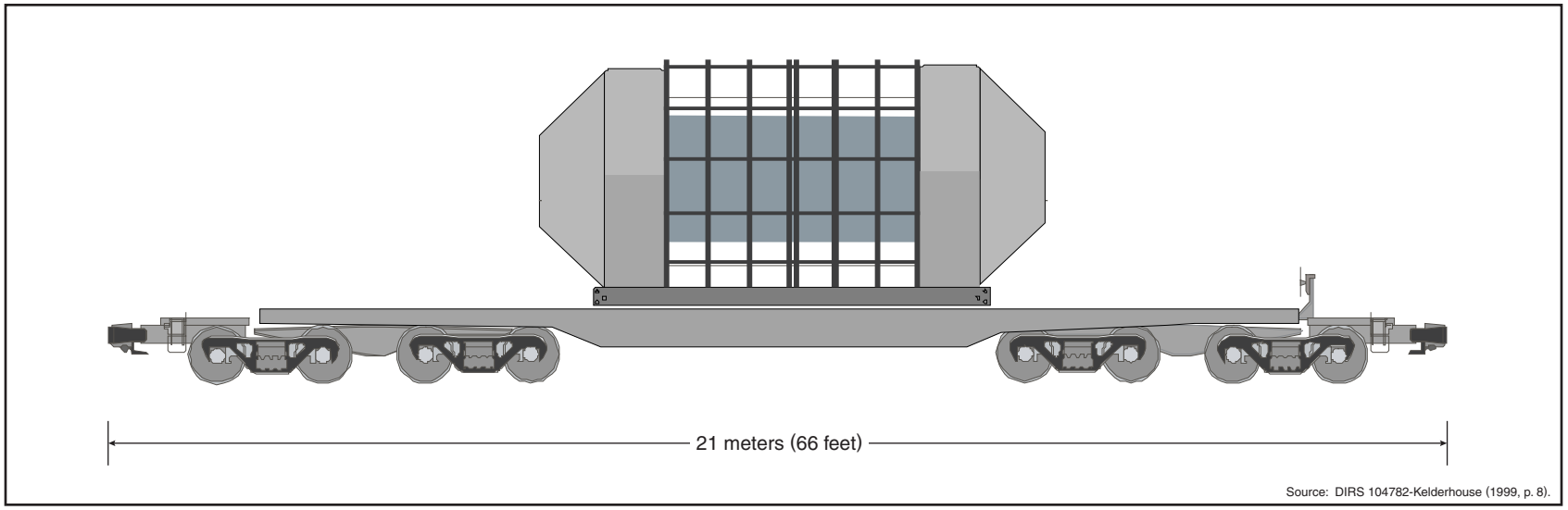

Figure 2-21. Artist's conception of a large rail cask on a railcar.

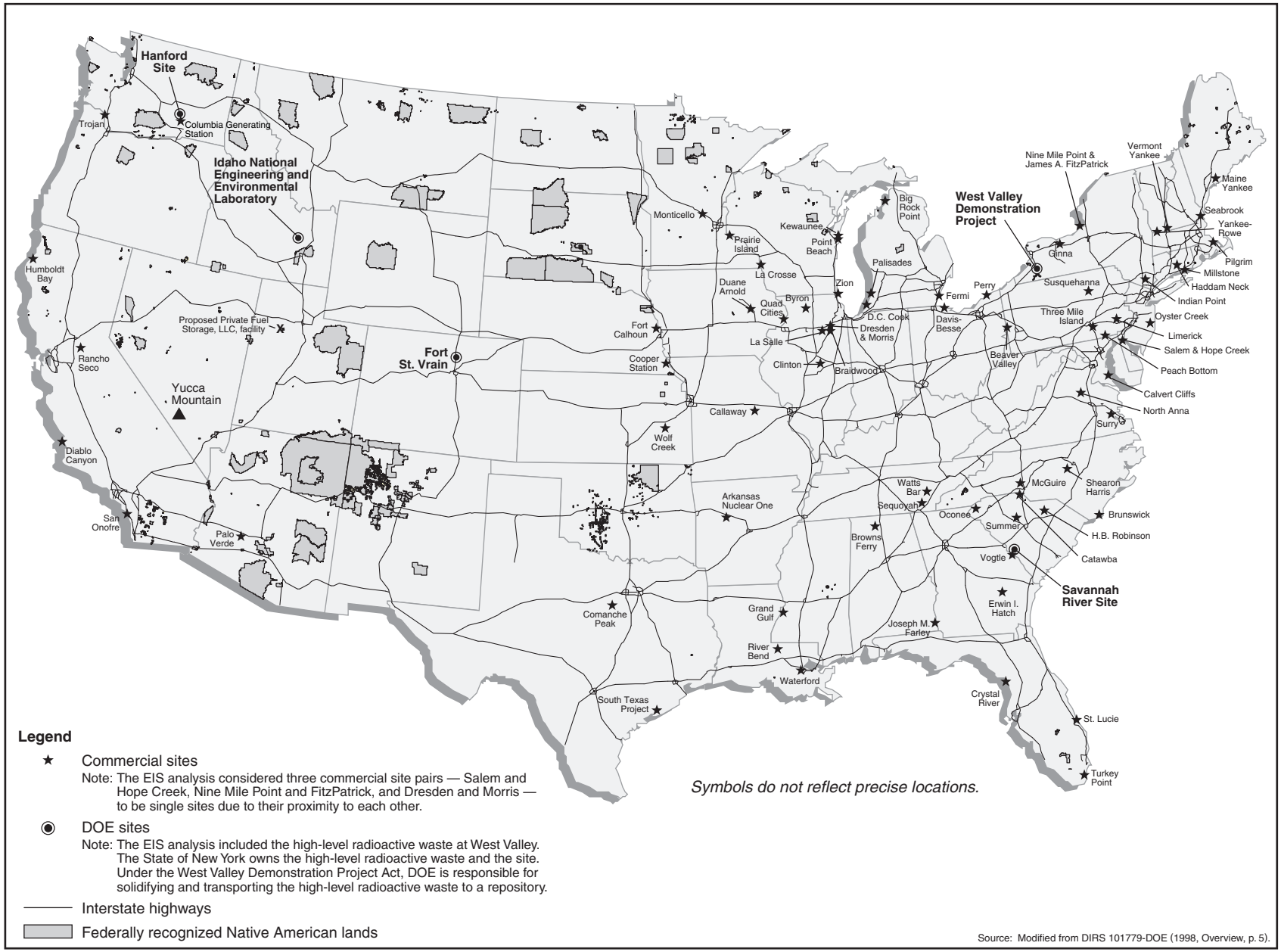

Figure 2-22a. Commercial and DOE sites and Yucca Mountain in relation to the U.S. Interstate Highway System.

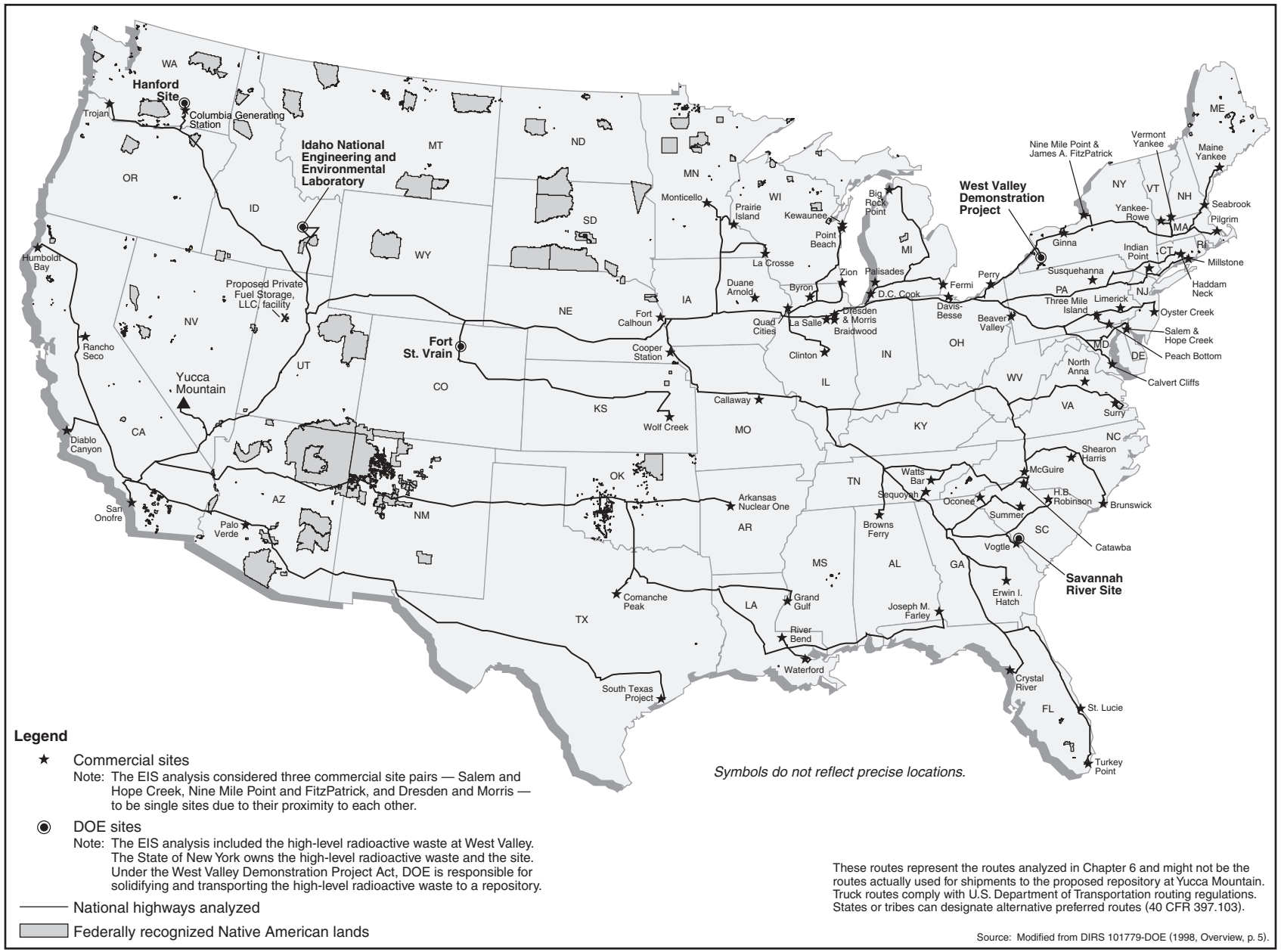

Figure 2-22b. Representative truck routes from commercial and DOE sites to Yucca Mountain analyzed for the Proposed Action.

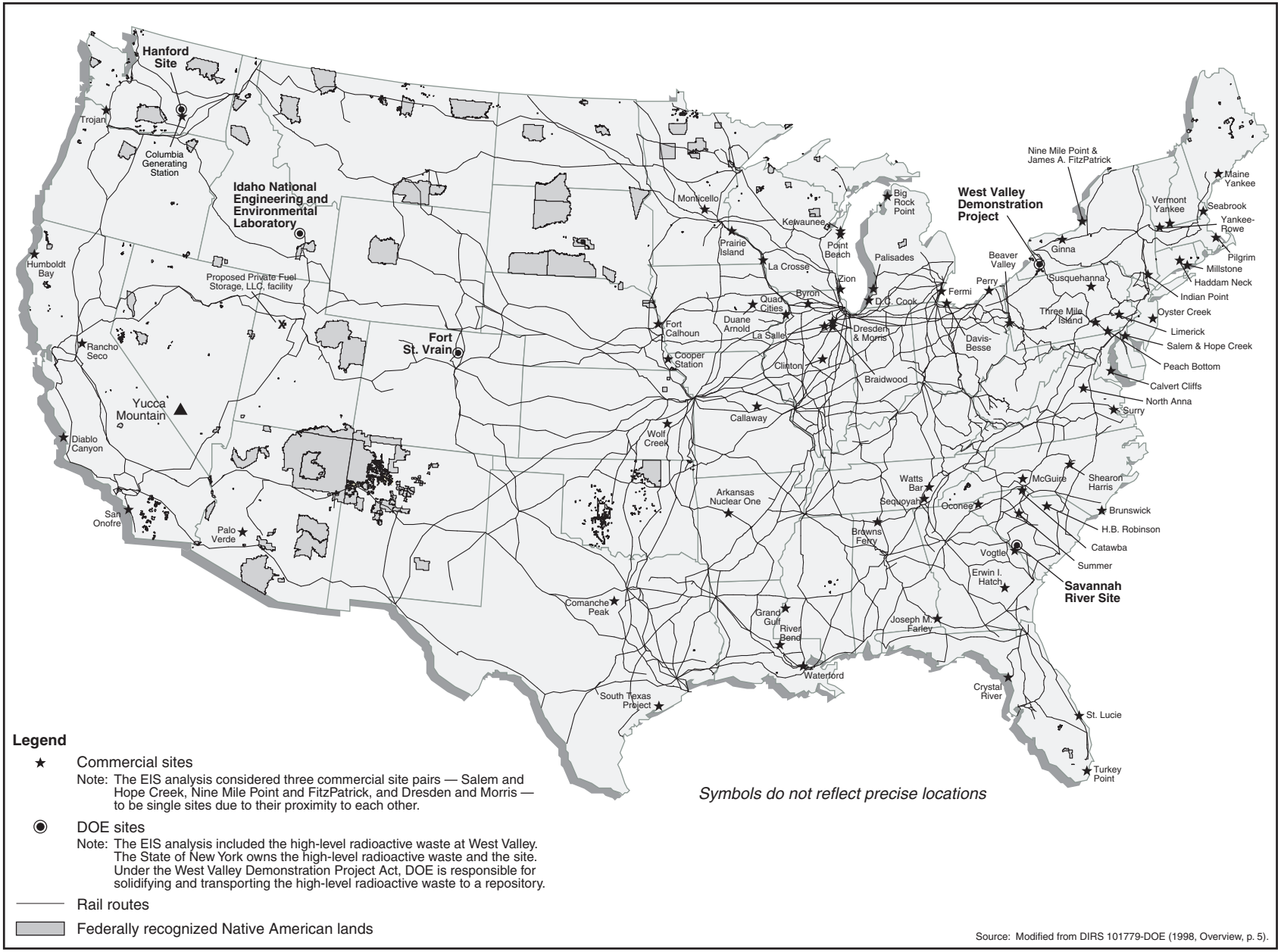

Figure 2-23a. Commercial and DOE sites and Yucca Mountain in relation to the U.S. railroad system.

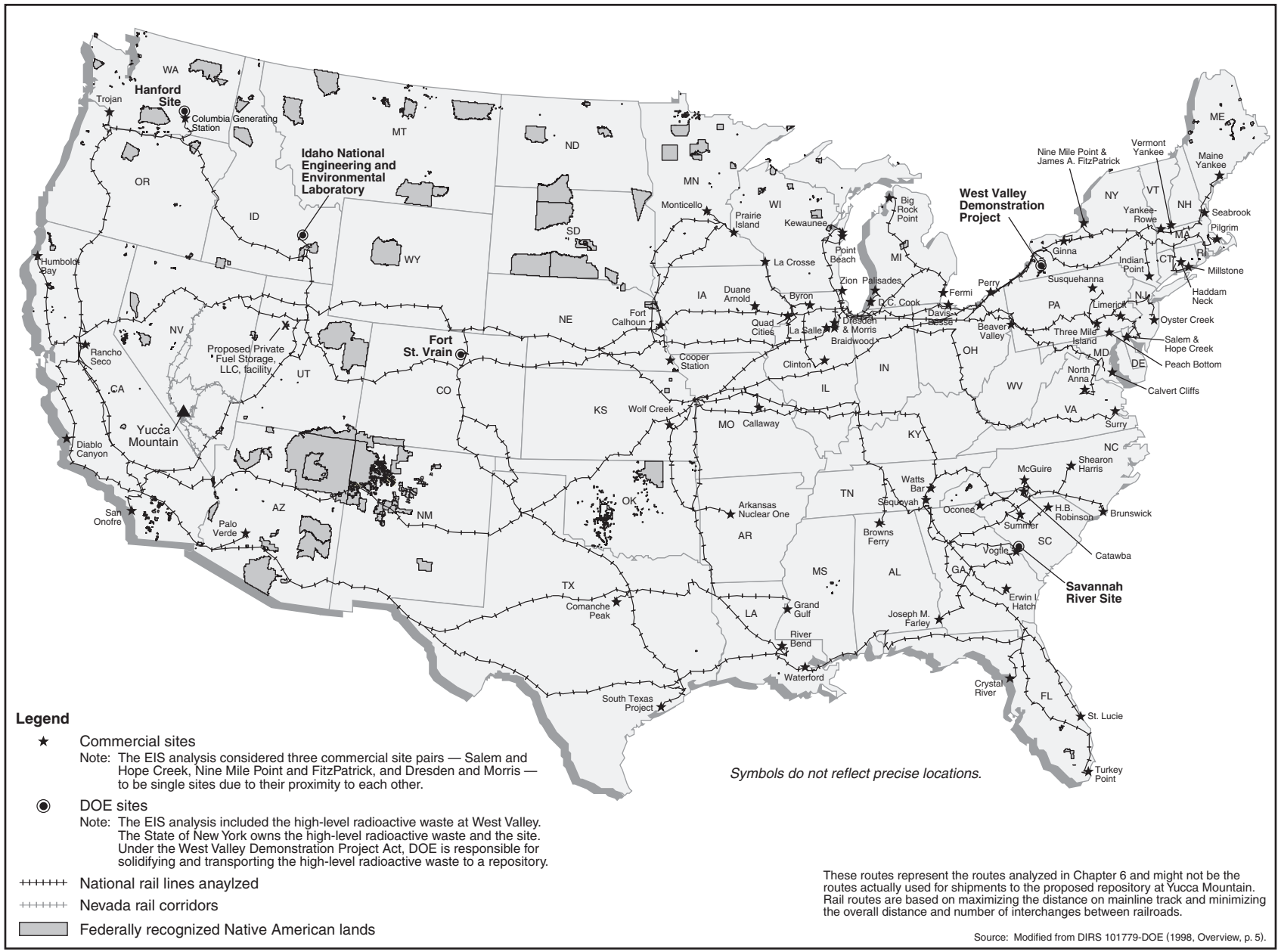

Figure 2-23b. Representative rail routes from commercial and DOE sites to Yucca Mountain analyzed for the Proposed Action.

sites that did not have rail access to a nearby rail access point. Such sites on navigable waterways could use barges to deliver spent nuclear fuel to a nearby rail access point. The transportation of spent nuclear fuel and high-level radioactive waste to the repository would comply with applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission, as well as applicable state and local regulations.

DOE would use a satellite-based transportation tracking and communications system (such as TRANSCOM), to track current truck and rail shipments of spent nuclear fuel and high-level radioactive waste to the repository. This or a similar system could provide users (for example, DOE, the Nuclear Regulatory Commission, and state and tribal governments) with information about shipments to the repository and would enable communication between the vehicle operators and a central communication station. Additional escorts are required for shipments in heavily populated areas. In these areas, armed escorts would be required for highway and rail shipments (10 CFR 73.37). The use of a satellite-based communication and tracking system, such as TRANSCOM, is subject to Nuclear Regulatory Commission approval. Under Nuclear Regulatory Commission regulations, specific information about shipments, such as time of departure and location during travel, must not be publicly disclosed and is only available to officials designated by state governors. In addition, notification and sharing of shipment information with Native American tribes is the subject of a proposed Nuclear Regulatory Commission rulemaking.

Section 180(c) of the NWPA requires DOE to provide technical and financial assistance to states and tribes for training public safety officials in jurisdictions through which it plans to transport spent nuclear fuel and high-level radioactive waste. The training is to include procedures for the safe routine transportation of these materials and for emergency response. DOE is developing the policy and procedures for implementing this assistance and has started discussions with the appropriate organizations. The Department would institute these plans before beginning shipments to the repository.

In the event of an incident involving a shipment of spent nuclear fuel or high-level radioactive waste, the transportation carrier would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident.

2.1.3.2.1 *National Transportation Shipping Scenarios*

DOE would ship spent nuclear fuel and high-level radioactive waste from commercial and DOE sites using some combination of the legal-weight truck, rail, heavy-haul truck, and barge modes of transport. This EIS considers two national transportation mode-mix scenarios, which for simplicity are referred to as the mostly legal-weight truck scenario and the mostly rail scenario. These scenarios encompass the broadest range of operating conditions relevant to potential impacts to human health and the environment. Table 2-3 summarizes these scenarios, and Appendix J provides additional details.

Table 2-3. National transportation scenarios (percentage based on number of shipments).[a]

Material[a]	Mostly legal-weight truck	Mostly rail
Commercial SNF	100% by legal-weight truck	About 90% by rail; about 10% by legal-weight truck
HLW	100% by legal-weight truck	100% by rail
DOE SNF	Mostly legal-weight truck; includes about 300 naval SNF shipments from INEEL to Nevada by rail	100% by rail

a. SNF = spent nuclear fuel; HLW = high-level radioactive waste; INEEL = Idaho National Engineering and Environmental Laboratory.